

Bachelor's / Semester / Master's Thesis, Guided Research, Interdisciplinary Project (IDP)

Realistic Physics Simulation in Autonomous Driving Scenarios

Keywords: autonomous driving – simulation – physics simulation

Background

As part of the research project CeCaS, our group has come up to build a new System Architecture for future vehicles with a focus on autonomous driving. The development of new autonomous vehicles requires a rethinking of the systems and software engineering to keep up with the growing complexity and the Implementation of the latest technologies such as AI-based functions in automotive engineering. For this purpose, our developed software is first integrated on an HPC system and then tested on real vehicles.

Description

A key challenge in this context lies in the usage of a realistic physics model which enables the testing of a vehicle in a virtual environment which is not that different from the real world. This makes it easier to transfer the developed system from the simulation to a real scenario. In addition, mechanical test benches, one of which belongs to our chair as part of the CeCaS project and enables us to test our algorithms in real vehicles, rely on a realistic physics simulation to provide the car mounted on them with the correct feedback. Therefore, it is essential to use a proper physics simulation and integrate it with the simulation environment, which is in our case based on CARLA.

- Research on state-of-the-art physics simulation
- Implementation, adaption, and integration of a realistic physics simulation
- **Your ideas:** If you have any other ideas for research in this area you are welcome to suggest your own topic.

Your Tasks

- Familiarization with state-of-the-art physics simulations
- Development of a novel solution approach for the specific problem
- Connecting the solution to CARLA
- Evaluation of the solution in our simulation environment
- Support in setting up our test environment

Requirements

- You are currently studying Computer Science, Electrical Engineering, Robotics, Mechanical Engineering (or similar)
- High motivation and ability to work independently on your research topic as well as contributing to our teamwork.
- Interest in autonomous driving and simulation
- Good understanding of driving simulators such as Carla as well as physics simulation
- Good knowledge in programming languages: Python, C++

